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ABSTRACT

This survey concerned first-year graduate enrollments in science and engineering for the fall of 1971 and expected enrollments for the fall of 1972. Each institution was asked to indicate (1) how many new applications it had received through July 5, 1971, and what the actual first-year graduate enrollment for that year had been; and (2) estimate enrollments for 1972, indicating the number of new applicants received as of July 5, 1972. This information was requested for the following fields: physical sciences, basic medical sciences, other biological sciences, psychology, other social sciences, engineering, and mathematical sciences. Results of the questionnaire indicate an anticipated overall increase of 2% in first-year science and engineering graduate enrollments, but the projected trends differ according to type of institution and field. Public institutions reported an expected increase, whereas private institutions said they expect a substantial decrease. (HS)

ED 070403

Higher Education Panel

Report

American Council on Education

Survey No. 10

August 11, 1972

Expected First-Year Graduate Enrollment in Science and Engineering, Fall 1972

Barbara A. Blandford
Joan C. Trexler

This survey of the Higher Education Panel (HEP), conducted in July 1972, concerned first-year graduate enrollments in science and engineering for the fall of 1971 and expected enrollments for the fall of 1972. (It was limited to institutions granting doctorates in science or engineering fields.) Each institution was asked to indicate, first, how many new applications it had received through July 5, 1971, and what the actual first-year graduate enrollment for that year had been; and then to estimate enrollments for 1972, indicating the number of new applications received as of July 5, 1972.. This information was requested for the following fields: physical sciences, basic medical sciences, other biological sciences, psychology, other social sciences, engineering, and mathematical sciences. (See Appendix A for a copy of the survey instrument and for term and field definitions.)

During the last week of June, the survey was mailed to 91 institutions granting doctoral degrees in science or engineering. (Seven of these institutions were independent medical colleges granting doctoral degrees.) Replies were received from 83 institutions (a return of 91 percent), two of

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which had to be excluded because of incomplete data. Consequently, this report is based on the returns from 81 institutions, or 89 percent of those originally surveyed.

Information on the sampling and weighting procedures may be found in Appendix B.

Results

An overall increase of 2 percent in first-year science and engineering graduate enrollments is anticipated in fall 1972, but the projected trends differ according to type of institution and field. Public institutions reported an expected increase, whereas private institutions said they expect a substantial decrease. The "Top Twenty" institutions (designated as such on the basis of their selection by NSF fellows and of Federal R&D funds awarded) expect declines in enrollments in all major science and engineering fields; "Developing" institutions (institutions which first awarded science or engineering doctorates in 1960 or later) reported that they expect enrollments to drop in physical sciences, social sciences, and engineering, and to rise in the other major categories. The remaining ("Other") institutions -- which make up the bulk of the Ph.D.-granting institutions -- expected increases in all major categories except engineering. The following table summarizes the changes anticipated.

Percentage Change Between 1971 and Expected 1972 First-Year Graduate Enrollment in Science and Engineering
[Doctorate-Granting Institutions]

	Type of Institution[a]					
	All	Public	Private	Top Twenty	Developing	Other
Field						
Physical Sciences	.7	2.9	- 6.7	- 5.9	- 8.7	7.2
Life Sciences	5.4	9.1	- 9.7	- 9.9	20.5	9.0
Social Sciences	6.3	9.6	- 4.5	- 8.7	- 2.2	11.3
Engineering	-7.1	-2.1	-14.9	-15.6	- 8.6	-2.3
Mathematical Sciences	1.7	11.4	-21.6	-17.7	10.5	8.0
Total	1.8	6.5	-11.0	-11.5	1.2	7.2
No. of institutions in:						
Sample	81	38	38	8	18	50
Population	226	131	85	20	57	139

[a]Breakdowns by type of institution exclude the independent medical colleges, which are included in the "all" column only.

More detailed data from this survey are given in Tables 1-15. Tables 1-7 show the percentage changes in actual applications received as of July 5 in 1971 and in 1972 and changes in projected enrollment (full-time and part-time) between those two years for the following categories: all institutions, public institutions, private institutions, independent medical colleges, "Top Twenty" institutions, "Developing" institutions, and "Other" Ph.D.-granting institutions. In Table 8, the percentage change between 1970 actual enrollment and 1971 projected enrollment[1] is compared with the percentage change between 1971 actual enrollment and 1972 projected enrollment.

Tables 9-12 contain data, by field, on actual new applications for 1971 and 1972, on actual first-year graduate enrollment for 1971, and on expected first-year graduate enrollment for 1972 for all doctoral-granting institutions, public institutions, private institutions, and independent medical colleges. The same information is given in Tables 13-15 for the "Top Twenty," "Developing," and "Other" Ph.D.-granting institutions.

[1]Barbara Blandford and Diane Dutton, Survey of First-Year Graduate and Postdoctoral Enrollment in Science and Engineering, Higher Education Panel Report, Survey No. 1 (Washington: American Council on Education, August 19, 1971).

Table 1

Expected Percentage Change Between 1971 and 1972 in First-Year Graduate Enrollment in Science and Engineering[a]

All Institutions
(N=226)

Field	New Applications Through July 5	Expected Total Enrollment	Expected Full-Time Enrollment	Expected Part-Time Enrollment
Physical Sciences	- 6.8	.7	.2	2.6
Life Sciences	6.7	5.4	2.8	11.2
Basic Medical Sciences	12.8	.8	.6	1.6
Other Biological Sciences	3.9	7.3	3.8	13.2
Social Sciences	12.7	6.3	6.7	4.2
Psychology	26.5	.6	1.8	- 8.9
Other Social Sciences	- .2	9.8	10.2	8.5
Engineering	-14.1	-7.1	- .1	-17.8
Mathematical Sciences	- 3.1	1.7	12.6	-13.5
Total	2.5	1.8	4.3	- 4.5

[a]Based on weighted population estimates.

Table 2

Expected Percentage Change Between 1971 and 1972 in First-Year Graduate Enrollment in Science and Engineering[a]

Public Institutions

(N=131)

Field	New Applications Through July 5	Expected Total Enrollment	Expected Full-Time Enrollment	Expected Part-Time Enrollment
Physical Sciences	- 3.3	2.9	1.3	9.1
Life Sciences	10.3	9.1	8.2	11.0
Basic Medical Sciences	18.0	12.0	17.9	- 9.9
Other Biological Sciences	7.3	8.3	4.6	14.6
Social Sciences	17.5	9.6	12.0	- 2.3
Psychology	27.9	4.2	7.3	-20.8
Other Social Sciences	6.1	13.2	15.5	4.3
Engineering	-11.2	- 2.1	3.7	-13.2
Mathematical Sciences	.7	11.4	14.8	5.4
Total	7.0	6.5	8.6	.5

[a]Based on weighted population estimates.

Table 3

Expected Percentage Change Between 1971 and 1972 in First-Year Graduate Enrollment in Science and Engineering[a]

Private Institutions

(N=85)

Field	New Applications Through July 5	Expected Total Enrollment	Expected Full-Time Enrollment	Expected Part-Time Enrollment
Physical Sciences	-12.7	- 6.7	- 3.8	-15.7
Life Sciences	.0	- 9.7	-16.2	7.1
Basic Medical Sciences	7.7	-25.4	-32.7	10.0
Other Biological Sciences	- 3.9	2.2	.1	6.0
Social Sciences	3.8	- 4.5	-11.3	21.8
Psychology	23.1	-14.3	-21.1	33.0
Other Social Sciences	-9.2	.2	- 5.9	19.0
Engineering	-17.8	-14.9	- 7.4	-23.2
Mathematical Sciences	-10.5	-21.6	- 5.0	-42.7
Total	- 5.3	-11.0	- 8.7	-15.3

[a]Based on weighted population estimates.

Table 4

Expected Percentage Change Between 1971 and 1972 in First-Year Graduate Enrollment in Science and Engineering[a]

Independent Medical Colleges
(N=10)

Field	New Applications Through July 5	Expected Total Enrollment	Expected Full-Time Enrollment	Expected Part-Time Enrollment
Physical Sciences	-----	----	----	----
Life Sciences	-12.7	14.7	.9	86.2
Basic Medical Sciences	-12.7	14.7	.9	86.2
Other Biological Sciences	-----	----	----	----
Social Sciences	-----	----	----	----
Psychology	-----	----	----	----
Other Social Sciences	-----	----	----	----
Engineering	-----	----	----	----
Mathematical Sciences	-----	----	----	----
Total	-12.7	14.7	.9	86.2

[a]Based on weighted population estimates.

Table 5

Expected Percentage Change Between 1971 and 1972 in First-Year Graduate Enrollment in Science and Engineering[a]

"Top Twenty" Institutions[b]
(N=20)

Field	New Applications Through July 5	Expected Total Enrollment	Expected Full-Time Enrollment	Expected Part-Time Enrollment
Physical Sciences	-10.3	- 5.9	- 7.2	2.0
Life Sciences	- 2.6	- 9.9	-13.6	- 2.9
Basic Medical Sciences	2.3	-13.5	-21.6	-23.1
Other Biological Sciences	- 5.8	- 7.7	- 6.4	- 9.3
Social Sciences	-11.1	- 8.7	-11.2	1.9
Psychology	- 1.3	- 1.7	- 4.0	15.9
Other Social Sciences	-16.9	-11.3	-14.2	- .9
Engineering	-16.4	-15.6	- 9.6	-32.9
Mathematical Sciences	-12.7	-17.7	- 6.3	-37.1
Total	-10.9	-11.5	- 9.9	-16.0

[a]Based on weighted population estimates.

[b]Designated on the basis of NSF fellow selection of these institutions for graduate study and on the basis of the largest amounts of Federal R&D money awarded.

Table 6

Expected Percentage Change Between 1971 and 1972 in First-Year Graduate Enrollment in Science and Engineering[a]

"Developing" Institutions[b]
(N=57)

Field	New Applications Through July 5	Expected Total Enrollment	Expected Full-Time Enrollment	Expected Part-Time Enrollment
Physical Sciences	1.9	- 8.7	- 8.6	- 9.2
Life Sciences	3.2	20.5	-27.0	101.8
Basic Medical Sciences	2.1	37.5	42.1	.0
Other Biological Sciences	3.4	19.4	-33.2	103.6
Social Sciences	11.6	- 2.2	1.4	-12.0
Psychology	10.7	-12.9	-11.5	-18.4
Other Social Sciences	12.9	4.1	10.4	- 9.5
Engineering	-18.1	- 8.6	-14.7	- 4.0
Mathematical Sciences	7.6	10.5	5.6	17.3
Total	2.6	1.2	- 8.0	18.1

[a]Based on weighted population estimates.

[b]Those institutions which first awarded science or engineering doctorates in 1960 or later.

Table 7

Expected Percentage Change Between 1971 and 1972 in First-Year Graduate Enrollment in Science and Engineering[a]

Other Graduate Institutions[b]
(N=139)

Field	New Applications Through July 5	Expected Total Enrollment	Expected Full-Time Enrollment	Expected Part-Time Enrollment
Physical Sciences	- 6.1	7.2	7.9	5.0
Life Sciences	13.0	9.0	19.6	-17.4
Basic Medical Sciences	24.8	7.3	15.4	-22.1
Other Biological Sciences	8.5	9.6	21.4	-16.2
Social Sciences	27.4	11.3	11.3	11.0
Psychology	42.6	3.5	4.9	- 9.4
Other Social Sciences	10.9	16.7	16.5	17.9
Engineering	-11.7	- 2.3	8.8	-17.4
Mathematical Sciences	2.1	8.0	22.5	-10.4
Total	10.9	7.2	12.8	- 7.5

[a]Based on weighted population estimates.

[b]All graduate institutions granting doctorates in science or engineering after eliminating "Top Twenty" and "Developing" institutions.

Table 8

Comparison of Projected Percentage Changes in First-Year Graduate Enrollment in Each of Two Periods (1970 to 1971 and 1971 to 1972)[a]

Field	All Institutions		Public Institutions		Private Institutions		Independent Medical Colleges	
	1970-71[b]	1971-72[c]	1970-71	1971-72	1970-71	1971-72	1970-71	1971-72
Physical Sciences	6.1	.7	9.5	2.9	-4.7	-6.7	--	--
Basic Medical Sciences[d]	-.5	.8	5.9	12.0	-14.6	-25.4	10.4	14.7
Other Biological Sciences[e]	4.1	7.3	5.2	8.3	-2.4	2.2	--	--
Psychology	9.4	.6	11.1	4.2	2.7	-14.3	--	--
Other Social Sciences[f]	5.5	9.8	5.9	13.1	4.8	.2	--	--
Engineering	-2.8	-7.1	1.3	-2.1	-10.4	-14.9	--	--
Mathematical Sciences	2.8	1.7	8.8	11.4	-3.4	-21.6	--	--
Total	2.9	1.8	6.1	6.5	-4.8	-11.0	10.4	14.7

[a]The 1970-71 percentage changes are derived from: Barbara Blandford and Diane Dutton, Survey of First-Year Graduate and Postdoctoral Enrollment in Science and Engineering, Higher Education Panel Report, Survey No. 1 (Washington: American Council on Education, August 19, 1971).

[b]Percentage change between actual 1970 enrollment and projected 1971 enrollment.

[c]Percentage change between actual 1971 enrollment and projected 1972 enrollment.

[d]In the 1970-71 survey, biometrics, biostatistics, cell biology, molecular biology, neuroscience, radio biology, and toxicology were not specifically included in the definition of this field.

[e]In the 1970-71 survey, this category was called "other life sciences" and plant pharmacology was not specifically included in the definition of the field.

[f]In the 1970-71 survey, archeology and geography were not specifically included in the definition of this field.

Table 9

Expected First-Year Graduate Enrollment[a] in Science and Engineering

All Institutions
(N=226)

Field	First-Year Graduate Enrollment							
	1971				1972			
	New Applications Through July 5	Actual First-Year Enrollment (Fall)			New Applications Through July 5	Expected First-Year Enrollment (Fall)		
	Total	Total	Full Time	Part Time	Total	Total	Full Time	Part Time
Physical Sciences	34,071	11,440	9,032	2,408	31,750	11,521	9,051	2,470
Life Sciences	43,757	15,999	10,942	5,057	46,688	16,868	11,246	5,622
Basic Medical Sciences	13,725	4,596	3,698	898	15,484	4,635	3,722	913
Other Biological Sciences	30,032	11,403	7,244	4,159	31,203	12,233	7,524	4,709
Social Sciences	105,906	30,753	25,318	5,435	119,347	32,685	27,019	5,666
Psychology	51,157	11,826	10,498	1,328	64,690	11,895	10,686	1,209
Other Social Sciences	54,749	18,927	14,820	4,107	54,656	20,787	16,332	4,455
Engineering	48,654	20,446	12,384	8,062	41,786	19,004	12,376	6,628
Mathematical Sciences	25,700	9,942	5,772	4,170	24,900	10,105	6,498	3,607
Total	258,087	88,580	63,448	25,132	264,471	90,183	66,190	23,993

Note: Some totals may add up to one more or less than the sum of the parts because of rounding.

[a]Weighted population estimates.

Table 10

Expected First-Year Graduate Enrollment[a]
in Science and Engineering

Public Institutions
(N=131)

Field	First-Year Graduate Enrollment							
	1971				1972			
	New Applications Through July 5	Actual First-Year Enrollment (Fall)			New Applications Through July 5	Expected First-Year Enrollment (Fall)		
	Total	Total	Full Time	Part Time	Total	Total	Full Time	Part Time
Physical Sciences	21,309	8,860	7,083	1,777	20,611	9,114	7,176	1,938
Life Sciences	29,260	12,398	8,294	4,104	32,285	13,529	8,974	4,555
Basic Medical Sciences	8,344	2,837	2,237	600	9,843	3,179	2,638	541
Other Biological Sciences	20,916	9,561	6,057	3,504	22,441	10,350	6,336	4,014
Social Sciences	68,449	23,569	19,600	3,969	80,450	25,826	21,946	3,880
Psychology	36,030	9,498	8,464	1,034	46,069	9,900	9,082	818
Other Social Sciences	32,419	14,071	11,136	2,936	34,380	15,924	12,863	3,061
Engineering	26,912	12,543	8,214	4,329	23,908	12,276	8,516	3,760
Mathematical Sciences	16,922	7,003	4,472	2,531	17,046	7,801	5,133	2,668
Total	162,851	64,373	47,663	16,710	174,300	68,546	51,745	16,801

Note: Some totals may add up to one more or less than the sum of the parts because of rounding.

[a]Weighted population estimates.

Table 11

Expected First-Year Graduate Enrollment[a]
in Science and Engineering

Private Institutions
(N=85)

Field	First-Year Graduate Enrollment							
	1971				1972			
	New Applications Through July 5	Actual First-Year Enrollment (Fall)			New Applications Through July 5	Expected First-Year Enrollment (Fall)		
	Total	Total	Full Time	Part Time	Total	Total	Full Time	Part Time
Physical Sciences	12,762	2,580	1,949	631	11,139	2,407	1,875	532
Life Sciences	13,750	3,244	2,349	895	13,751	2,929	1,970	959
Basic Medical Sciences	4,634	1,402	1,162	240	4,989	1,046	782	264
Other Biological Sciences	9,116	1,842	1,187	655	8,762	1,883	1,188	695
Social Sciences	37,457	7,184	5,718	1,466	38,897	6,859	5,073	1,786
Psychology	15,127	2,328	2,034	294	18,621	1,995	1,604	391
Other Social Sciences	22,330	4,856	3,684	1,171	20,276	4,863	3,469	1,394
Engineering	21,742	7,903	4,170	3,733	17,878	6,728	3,860	2,868
Mathematical Sciences	8,778	2,939	1,300	1,639	7,854	2,304	1,365	939
Total	94,489	23,850	15,486	8,364	89,519	21,227	14,143	7,084

Note: Some totals may add up to one more or less than the sum of the parts because of rounding.

[a]Weighted population estimates.

Table 12

Expected First-Year Graduate Enrollment[a]
in Science and Engineering

Independent Medical Schools
(N=10)

Field	First-Year Graduate Enrollment							
	1971				1972			
	New Applications Through July 5	Actual First-Year Enrollment (Fall)			New Applications Through July 5	Expected First-Year Enrollment (Fall)		
	Total	Total	Full Time	Part Time	Total	Total	Full Time	Part Time
Physical Sciences	---	---	---	---	---	---	---	---
Life Sciences	747	357	299	58	652	410	302	108
Basic Medical Sciences	747	357	299	58	652	410	302	108
Other Biological Sciences	---	---	---	---	---	---	---	---
Social Sciences	---	---	---	---	---	---	---	---
Psychology	---	---	---	---	---	---	---	---
Other Social Sciences	---	---	---	---	---	---	---	---
Engineering	---	---	---	---	---	---	---	---
Mathematical Sciences	---	---	---	---	---	---	---	---
Total	747	357	299	58	652	410	302	108

Note: Some totals may add up to one more or less than the sum of the parts because of rounding.

[a]Weighted population estimates.

Table 13

Expected First-Year Graduate Enrollment[a]
in Science and Engineering

"Top Twenty" Institutions[b]
(N=20)

Field	First-Year Graduate Enrollment							
	1971				1972			
	New Applications Through July 5	Actual First-Year Enrollment (Fall)			New Applications Through July 5	Expected First-Year Enrollment (Fall)		
	Total	Total	Full Time	Part Time	Total	Total	Full Time	Part Time
Physical Sciences	12,674	3,487	3,002	485	11,371	3,281	2,786	495
Life Sciences	13,574	4,714	3,063	1,651	13,218	4,248	2,645	1,603
Basic Medical Sciences	5,308	1,781	1,457	324	5,429	1,541	1,142	399
Other Biological Sciences	8,266	2,933	1,606	1,327	7,789	2,707	1,503	1,204
Social Sciences	35,268	4,628	3,741	887	31,350	4,227	3,323	904
Psychology	13,162	1,259	1,111	148	12,987	1,238	1,066	171
Other Social Sciences	22,107	3,369	2,630	739	18,363	2,989	2,257	733
Engineering	16,737	6,037	4,472	1,565	13,991	5,095	4,044	1,051
Mathematical Sciences	9,807	2,565	1,616	949	8,558	2,112	1,515	597
Total	88,060	21,431	15,894	5,537	78,488	18,963	14,313	4,650

Note: Some totals may add up to one more or less than the sum of the parts because of rounding.

[a] Weighted population estimates.

[b] Designated on the basis of NSF fellow selection of these institutions for graduate study and on the basis of the largest amounts of Federal R&D money awarded.

Table 14

Expected First-Year Graduate Enrollment[a]
in Science and Engineering

"Developing" Institutions[b]
(N=57)

Field	First-Year Graduate Enrollment							
	1971				1972			
	New Applications Through July 5	Actual First-Year Enrollment (Fall)			New Applications Through July 5	Expected First-Year Enrollment (Fall)		
	Total	Total	Full Time	Part Time	Total	Total	Full Time	Part Time
Physical Sciences	3,586	1,791	1,483	308	3,654	1,636	1,356	280
Life Sciences	4,587	2,608	1,647	961	4,734	3,142	1,203	1,940
Basic Medical Sciences	746	153	136	17	761	210	193	17
Other Biological Sciences	3,841	2,455	1,511	944	3,973	2,932	1,009	1,923
Social Sciences	12,595	4,562	3,317	1,245	14,049	4,461	3,365	1,096
Psychology	7,762	1,699	1,354	344	8,594	1,480	1,199	281
Other Social Sciences	4,832	2,864	1,963	901	5,455	2,981	2,167	815
Engineering	6,031	2,731	1,183	1,549	4,940	2,496	1,008	1,487
Mathematical Sciences	2,208	1,080	632	448	2,375	1,193	668	525
Total	29,007	12,772	8,262	4,511	29,752	12,928	7,600	5,328

Note: Some totals may add up to one more or less than the sum of the parts because of rounding.

[a]Weighted population estimates.

[b]Those institutions which first awarded science or engineering doctorates in 1960 or later.

Table 15

Expected First-Year Graduate Enrollment[a] in Science and Engineering

Other Doctoral-Granting Institutions[b]
(N=139)

Field	First-Year Graduate Enrollment							
	1971				1972			
	New Applications Through July 5	Actual First-Year Enrollment (Fall)			New Applications Through July 5	Expected First-Year Enrollment (Fall)		
	Total	Total	Full Time	Part Time	Total	Total	Full Time	Part Time
Physical Sciences	17,812	6,163	4,548	1,615	16,725	6,604	4,909	1,695
Life Sciences	24,848	8,321	5,933	2,388	28,084	9,067	7,095	1,972
Basic Medical Sciences	6,924	2,306	1,806	500	8,643	2,474	2,084	390
Other Biological Sciences	17,924	6,014	4,127	1,887	19,441	6,593	5,011	1,582
Social Sciences	58,043	21,562	18,259	3,303	73,947	23,996	20,330	3,665
Psychology	30,233	8,868	8,032	836	43,109	9,179	8,422	757
Other Social Sciences	27,810	12,694	10,226	2,467	30,838	14,817	11,909	2,908
Engineering	25,887	11,678	6,729	4,949	22,856	11,414	7,323	4,090
Mathematical Sciences	13,686	6,296	3,523	2,773	13,966	6,800	4,315	2,485
Total	140,276	54,020	38,992	15,028	155,578	57,881	43,972	13,907

Note: Some totals may add up to one more or less than the sum of the parts because of rounding.

[a] Weighted population estimates.

[b] All graduate institutions granting doctorates in science or engineering remaining after eliminating "Top Twenty" and "Developing" institutions.

APPENDICES

Appendix A

American Council on Education
Higher Education Panel
Survey No. 10

First-Year Enrollment for Advanced Degrees
In Science and Engineering

Fields	First-Year Enrollment							
	1971				1972			
	New Applications Through July 5	Actual 1st Year Enrollment (Fall)			New Applications Through July 5	Expected 1st Year Enrollment (Fall)		
	Total	Total	Full Time	Part Time	Total	Total	Full Time	Part Time
Physical Sciences:								
Life Sciences:								
Basic Medical Sciences								
Other Biological Sciences								
Social Sciences:								
Psychology								
Other Social Sciences								
Engineering:								
Mathematical Sciences:								

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Definitions

First-year enrollment: Students enrolled for a master's or higher academic degree (e.g., Ph.D., Ed.D.) who have completed less than two semesters or three quarters of full-time graduate study or the equivalent in part-time study; a full-time student's academic load in terms of course work or other activity (e.g., research, teaching) is at least 75 percent of that normally required. Do not include students enrolled for first professional degrees (e.g., M.D., D.D.S., LL.B.) unless they are also enrolled for a master's or higher degree.

Physical sciences: Includes chemistry, earth science, physics, geology, meteorology, astronomy, metallurgy, geophysics, oceanography, pharmaceutical chemistry, and other.

Basic medical sciences: Includes anatomy, biochemistry, biometrics and biostatistics, biophysics, cell biology, microbiology, molecular biology, neuroscience, pathology, pharmacology, physiology, radio biology, toxicology.

Other biological sciences: Includes agriculture, forestry, biology, botany, zoology, ecology, embryology, entomology, genetics, nutrition, plant pathology, plant physiology, plant pharmacology, and other.

Psychology: Includes all psychology.

Other social sciences: Includes anthropology, archeology, economics, political science, geography, sociology, government. Do not include history, education, social work, public administration, agricultural economics, or other applied fields.

Engineering: Includes aeronautical, architectural, biomedical, ceramic, chemical, civil, electrical, engineering sciences, environmental health engineering, geological, industrial, mechanical, mining, nuclear, petroleum, and all other forms of engineering.

Mathematical sciences: Includes mathematics, statistics, computer sciences, data processing, systems analysis.

Appendix B

Sampling and Weighting Procedures

Because the present survey is a partial replication of Higher Education Panel Survey No. 1 (conducted in July 1971 to examine changes in applications and enrollments between 1970 and 1971), it uses similar sampling and weighting procedures. The basic data units are the applicants for, and first-year graduate students enrolling in, specified science and engineering fields in institutions (the basic observation unit) granting doctorates in those fields. The sampling and weighting base was updated from 1969 enrollment for advanced degrees as reported in HEGIS-IV to the more recent 1970 enrollments as reported in HEGIS-V. To the 222 institutions (including ten independent medical colleges) previously identified, three institutions designated as "Developing" by the National Science Foundation were added, along with one public university. Thus, the institutional population for this study comprises 226 colleges, universities, and independent medical colleges granting doctorates in the science and engineering fields. The participating (final) sample consisted of 81 institutions (36 percent of the population), including the public university but not the three "Developing" institutions that were added to the population. The population and sample were stratified into five cells. The stratification scheme -- with population counts, sample counts, and percentages of the population in the sample -- is shown below:

Cell	Definition	Population	Final Sample	Percent of Population in Sample
1	Public universities	106	33	31.1
2	Private universities	57	25	43.8
3	Public four-year colleges	25	5	20.0
4	Private four-year colleges	28	13	46.4
5	Independent medical colleges	10	5	50.0
	Total	226	81	35.8

Data from a given institution were weighted using a set of weights determined by the cell membership of that institution in the sampling design. As in the earlier survey (HEP Survey No. 1), cell weights were computed separately for part-time and for full-time enrollments in each field. In contrast to the earlier survey, however, separate weights were not computed for the grand total and for marginal enrollments, because this procedure leads to inconsistencies between such total weighted counts and counts obtained by summing the separately weighted parts. Our experience with the earlier survey led us to conclude that these inconsistencies, though rather small, were troublesome. Thus, in the present survey, the weighting was done in terms of part-time and full-time enrollments by field, and by cell; the totals were obtained by summing the weighted data in the breakouts. The totals, so estimated, are probably more accurate than directly weighted totals which are equivalent to using marginal weighting factors instead of specific weighting factors for each kind of breakout. Each weighting factor computed within a breakout -- defined by stratification cell, field, and enrollment status -- represents the ratio of 1970 enrollments for advanced degrees in the population institutions to enrollments in the sampled institutions within that breakout.

The weighting of applications (as opposed to enrollments) follows the same principles except that no distinction is made between part-time and full-time status, so that the total enrollments reported in HEGIS-V for the relevant fields becomes the basis for computing the cell weights.

The enrollment and application data, when reported for the three National Science Foundation categories ("Top Twenty," "Developing," and "Other"), were not reweighted in terms of those categories. The same

cell weights by field were used, and the NSF categories treated as a reporting breakout of the cells. The figures for the NSF categories do not include the independent medical colleges.